

## EAORC BULLETIN 1,077 – 4 February 2024

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## NOTICES

### PUBLICATION ALERTS

If you have had a paper or book published, or you see something which would be of interest to the group, please send me a publication alert so that I can include it in the newsletter. Many thanks to those who have already sent in alerts.

If there is a journal you feel I should be tracking on a regular basis, let me know.

And if you have any other ideas for extending the “EAORC experience”, please contact me.

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### EDITORIAL INTERJECTIONS

Comments in curly brackets are editorial interjections. The Editor reserves the right to be wrong.

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### ACADEMIA.EDU – Bootstrapping Ordinal Thinking

*In Thomas Wynn & Frederick L. Coolidge (eds.), Cognitive Models in Palaeolithic Archaeology, Oxford University Press, 197-213 (2017).*

#### THOMAS WYNN et al – Bootstrapping Ordinal Thinking

Paleoanthropology has long championed a biocultural perspective on human evolution in which biology and culture are seen to have evolved together to produce the modern human condition. Most paleoanthropological accounts of evolutionary mechanism, however, remain fairly straightforward Darwinian models elaborated with ecological and demographic insights. In such models, biology–culture co-evolution occurs via selection for cultural capacity. In the narrower domain of cognitive evolution, the interrelationship between culture and biology, especially via technology, has been a tantalizing but poorly explored area of research. Are there components of human cognition that evolved specifically in response to human culture? It certainly seems as if there should be; after all, extensive reliance on culture is one of the things that distinguishes us from our primate cousins. Yet the literature remains frustratingly vague. Dunbar and colleagues (Dunbar, Gamble, & Gowlett, 2014) have proposed theory of mind as a response to complex social life, with Cole (2014 and Chapter 8, this volume) proposing a role for handaxes in the evolution of second- and third-order levels of intentionality. Recently, Overmann has explored the material basis of numerosity (2013, 2015, and Chapter 5, this volume) and literacy (2016), but there are few other examples that integrate a specific technology with a specific cognitive ability and its neural substrate. In this chapter, we propose to do just this by describing how a narrowly circumscribed cognitive ability—conceiving of ordinal sequences—could have evolved relatively quickly via embodied and extended cognition and the developmental process of neuronal recycling.

[https://www.academia.edu/112376206/Cognitive\\_Models\\_in\\_Palaeolithic\\_Archaeology](https://www.academia.edu/112376206/Cognitive_Models_in_Palaeolithic_Archaeology)

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### OTHER PUBLICATIONS – Perceptual Experience [OPEN ACCESS BOOK]

*Oxford University Press (2022).*

#### CHRISTOPHER S. HILL – Perceptual Experience

This book offers an account of perceptual experience—its intrinsic nature, its engagement with the world, its relations to mental states of other kinds, and its role in epistemic norms. One of the book’s main claims is that perceptual experience constitutively involves representations of worldly items. A second claim is that the relevant form of representation can be explained in broadly biological terms. After defending these foundational doctrines, the book proceeds to give an account of perceptual appearances and how they are related to the objective world. Appearances turn out to be relational, viewpoint dependent properties of external objects. There is also a complementary account of how the objects that possess these properties are represented. Another major concern is the phenomenological dimension of perception. The book maintains

that perceptual phenomenology can be explained reductively in terms of the representational contents of experiences, and it uses this doctrine to undercut the traditional arguments for dualism. This treatment of perceptual phenomenology is then expanded to encompass cognitive phenomenology, the phenomenology of moods and emotions, and the phenomenology of pain. The next topic is the various forms of consciousness that perceptual experience can possess. A principal aim is to show that phenomenology is metaphysically independent of these forms of consciousness, and another is to de-mystify the form known as phenomenal consciousness. The book concludes by discussing the relations of various kinds that perceptual experiences bear to higher level cognitive states, including relations of format, content, and justification or support.

<https://academic.oup.com/book/44118>

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## CONFERENCE ALERT – Animal Behavior Society 2024

### ***The Animal Behavior Society ABS 2024 Abstract Submission and Early Registration is Open!***

The 61st Annual Conference of the ABS takes place at Western University Canada, London, Ontario, June 26-29, 2024

#### ***Abstract Submission Deadline is March 8th, 2024.***

Registrants may submit one abstract for an oral or poster presentation. ABS policy is that acceptance of submissions for the oral sessions are on a first-come, first-served basis. Abstracts cannot be submitted until meeting registration (including payment) is complete.

<https://www.animalbehaviorsociety.org/2024/abstracts.php> for the complete abstract submission guidelines.

Please contact us at [info@animalbehaviorsociety.org](mailto:info@animalbehaviorsociety.org) with any questions concerning the abstract submission process.

SUBMIT AN ABSTRACT: <https://www.animalbehaviorsociety.org/2024/abstracts.php>

#### ***Early Registration Deadline is March 21st, 2024***

We invite you to join us at the 61st Annual Conference of the Animal Behavior Society in London, Ontario, 26-29 June 2024. Register early and save!

ABS 2024 will have two options for participating in this year's meeting. The details of each participation option are here

<https://www.animalbehaviorsociety.org/2024/program-hybrid.php> and include information for both authors and attendees.

REGISTER NOW: <https://www.animalbehaviorsociety.org/2024/registration.php>

Please contact us if you have any questions regarding conference registration or the abstract submission process.

The Animal Behavior Society Email: [info@animalbehaviorsociety.org](mailto:info@animalbehaviorsociety.org); Phone: 312-893-6585

VISIT OUR WEBSITE: <https://www.animalbehaviorsociety.org/web/index.php>

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## NEWS

### **NATURE BRIEFING – AI learns language through a baby's eyes**

By strapping a camera to a child's head, researchers have gained an insight into how children acquire language. A baby boy wore the camera for around one hour twice a week, from the age of six months to around two years. Researchers trained an AI system on frames from the video and words spoken to Sam, transcribed from the recording. It learnt to recognize words such as 'crib' and 'ball' by building associations between images and words, without any other prior knowledge about language. That challenges the theory that babies need some innate knowledge about how language works, says AI researcher Wai Keen Vong, who co-authored the research.

<https://www.nature.com/articles/d41586-024-00288-1>

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### **NATURE BRIEFING – Podcast: Who made these stone tools?**

A type of ancient stone blade was made by the first Homo sapiens that moved into northern Europe some 45,000 years ago – not by Neanderthals. Researchers sifted through thousands of pieces of rubble at one of the few sites that had been left untouched by early 20th-century archaeologists. "It's an ancient cave that collapsed, there is a layer with blocks that are about the size of a car," paleoanthropologist and study co-author Jean-Jacques Hublin tells the Nature Podcast. DNA analysis of 13 bone fragments confirmed that they belonged to modern humans that probably started living at the periphery of the Neanderthals' domain.

<https://www.nature.com/articles/d41586-024-00290-7>

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### **SAPIENS – Celebrity Status Almost Ruined Ancient DNA Research**

"The morning of my 26th birthday, I woke up to incredible news for my field of evolutionary anthropology: For the first time, the study of human evolution won a Nobel Prize. Geneticist Svante Pääbo had, according to the awarding group, made a 'seemingly impossible task' possible: extracting DNA from the remains of individuals who lived long ago.

Pääbo had turned science fiction into science fact, and now the entire field was being rewarded. But the odds did not always favor ancient DNA making that jump.

From its beginning, paleogenetics has developed in the media spotlight. Many in the press and public wanted to know if, how, and when extinct species would be resurrected from aDNA (as ancient DNA is often shortened to). This publicity sometimes steered the science, undermining the scientific method. Such interest also distracted from the breakthrough's Nobel-worthy value: answering scientific questions about species' history and evolution.

How did aDNA's celebrity influence its development—and what can we learn from this journey?"

<https://www.sapiens.org/biology/ancient-dna-paleogenetics/>

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### SCIENCEADVISER – Ancient jewelry shines a light on how ice age Europeans lived and interacted

Your jewelry and personal adornments can signify all kinds of things to others. Your ring may let others know you're married; your earrings tell people you're a fan of birds. For people living across Europe during the last ice age, such jewelry may have signaled which cultural group one hailed from, according to a new study comparing thousands of handcrafted beads and adornments from dozens of widespread sites.

Between 34,000 and 24,000 years ago, European foragers fashioned beads from diverse materials, including ivory, bone, seashells, human and animal teeth, and flashy stones. Scientists refer to their culture broadly as the Gravettian. When scientists compared bead types between sites, they found that places with similar accoutrements tended to cluster geographically. All told, they identified nine groups with distinct material cultures.

Curiously, belonging to the same material culture didn't always indicate people were closely related genetically. That suggests that as people roved and encountered one another, some blended into the local customs, implying cultural boundaries at the time were somewhat porous, the authors note.

<https://www.science.org/content/article/landmark-paper-shows-why-ice-age-europeans-wore-jewelry>

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### SCIENCEADVISER – Humans spread across ice age Europe earlier than thought

More than 45,000 years ago, small bands of hunters chased horses, reindeer, and mammoths over a vast expanse of tundra in northern Europe. They rarely stayed anywhere for long, leaving just a scattering of stone tools and traces of the odd campfire. Were they the first modern humans—people like us—to reach Europe from Africa, or some of the continent's last Neanderthals?

Archaeologists have found an answer in a German cave, which yielded a type of stone blade known from other northern European sites, along with fragments of human bone—presumably from the toolmakers. New DNA testing reported in *Nature* has shown that these bones, which predate most other evidence of modern humans in Europe, indeed came from our species. Given the many other places in Europe where similar tools have been found, it looks like “early humans were far more widely spread, much earlier than we thought,” says University of Vienna archaeological scientist Tom Higham, who was not involved with the research.

Now archaeologists are picturing an ice age mosaic in Europe, with bands of modern humans sharing the continent with Neanderthals for thousands of years. It also has them marveling at early humans' hardiness. In related work, scientists analyzed oxygen isotopes in horse teeth from the same cave layers to capture a hyperlocal weather report from 48,000 years ago. Grab your mammoth pelt! The average temperature was 7°C to 15°C colder than modern-day Germany.

<https://www.science.org/content/article/mysterious-ice-age-artifacts-suggest-modern-humans-and-neanderthals-overlapped-europe>

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### SCIENCEADVISER – Archaeologists tie up puzzling ice age artifacts' loose ends

For decades, archaeologists excavating ice age sites across France and Germany have turned up peculiar, perforated objects of antler, ivory or bone. These carefully-made, robust artifacts with regularly spaced holes date back to around 35,000 years ago when members of our species were pressing into Europe, creating cave art and adorning themselves with jewelry. Were these holey batons some kind of scepters? Perhaps ritualistic magic wands?

Nope. They were used to make rope. That's the conclusion of a new *Science Advances* study which pinned down the prosaic use for these puzzling objects. One clue came when researchers found microscopic plant fibers embedded in the grooves surrounding the holes. Another came from the fact that in the Middle Ages, ropemakers used similar tools made from drilled wood to braid fibers into multistranded rope.

To put their theory to the test, the researchers made replicas of the ancient tools from wood and an African warthog tusk, and then tried making rope with them. With a little practice, they mastered the craft, manufacturing five meters of rope in about 10 minutes using everything from flax and hemp to cattail reeds—all plants that would have been plentiful to ice age European hunters and foragers. The ropes were strong enough to hold the weight of even the largest team members, suggesting they would have been up to the task of fastening stone points to spears, tying down tents, and securing packages of meat.

<https://www.science.org/content/article/puzzling-prehistoric-artifacts-served-practical-purpose-ropemaking>

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### SCIENCE.ORG NEWS – ‘Landmark paper’ shows why ice age Europeans wore jewelry

Pendants and beads reveal nine cultures living across the continent 30,000 years ago.

<https://www.science.org/content/article/landmark-paper-shows-why-ice-age-europeans-wore-jewelry>

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SCIENCE.ORG NEWS – Mysterious artifacts suggest modern humans and Neanderthals lived side by side for millennia. Hunters of our species braved cold, harsh conditions as they pushed into ice age Europe.

<https://www.science.org/content/article/mysterious-ice-age-artifacts-suggest-modern-humans-and-neanderthals-overlapped-europe>

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SCIENCE.ORG NEWS – Puzzling prehistoric artifacts served a practical purpose: ropemaking

Once thought to be ritual wands or scepters, archaeologists crafted cords using replicas of the ancient tools.

<https://www.science.org/content/article/puzzling-prehistoric-artifacts-served-practical-purpose-ropemaking>

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SCIENCE.ORG NEWS – Citation cartels help some mathematicians—and their universities—climb the rankings

Widespread citation manipulation has led entire field of math to be excluded from influential list of top researchers.

<https://www.science.org/content/article/citation-cartels-help-some-mathematicians-and-their-universities-climb-rankings>

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## PUBLICATIONS

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### Biology Letters

#### PAPERS

**RUITONG YAO & ELIAS GARCIA-PELEGRIN – Oriental pied hornbills (*Anthracoceros albirostris*) solve invisible displacement tasks in a test of Piagetian object permanence**

Object permanence, the ability to mentally represent objects even when they are not directly accessible to the senses, is of vital importance for the survival of both human and non-human animals. The Oriental pied hornbill (*Anthracoceros albirostris*) is an Asian species of hornbill displaying remarkable adaptability in various environments, yet little is known about their cognitive abilities. Their breeding behaviour is unique, as the female hornbill seals herself inside a cavity before laying eggs and the male feeds her and their offspring without visual contact, strongly suggesting the presence of object permanence to some degree. In this study, six Oriental pied hornbills underwent testing for object permanence, including a series of seven standard Piagetian tasks involving visible and invisible displacements. The subjects consistently demonstrated spontaneous object permanence in all stages leading up to the invisible displacement stage. Half of the subjects achieved full stage 6 double invisible displacement Piagetian object permanence, while the other half reached stage 5 double visible displacement. Breeding behaviour and the duration of developmental stages are proposed as potential factors influencing object permanence ability in this species of hornbill.

<https://royalsocietypublishing.org/doi/full/10.1098/rsbl.2023.0547>

**YOU ZHOU, ANDREW N. RADFORD & ROBERT D. MAGRATH – Noise constrains heterospecific eavesdropping more than conspecific reception of alarm calls**

Many vertebrates eavesdrop on alarm calls of other species, as well as responding to their own species' calls, but eavesdropping on heterospecific alarm calls might be harder than conspecific reception when environmental conditions make perception or recognition of calls difficult. This could occur because individuals lack hearing specializations for heterospecific calls, have less familiarity with them, or require more details of call structure to identify calls they have learned to recognize. We used a field playback experiment to provide a direct test of whether noise, as an environmental perceptual challenge, reduces response to heterospecific compared to conspecific alarm calls. We broadcast superb fairy-wren (*Malurus cyaneus*) and white-browed scrubwren (*Sericornis frontalis*) flee alarm calls to each species with or without simultaneous broadcast of ambient noise. Using two species allows isolation of the challenge of heterospecific eavesdropping independently of any effect of call structure on acoustic masking. As predicted, birds were less likely to flee to heterospecific than conspecific alarm calls during noise. We conclude that eavesdropping was harder in noise, which means that noise could disrupt information on danger in natural eavesdropping webs and so compromise survival. This is particularly significant in a world with increasing anthropogenic noise.

<https://royalsocietypublishing.org/doi/full/10.1098/rsbl.2023.0410>

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### Current Anthropology

#### PAPERS

**MATT TOMLINSON – Hinged Dialogues and Heteroglossic Silence: Ritual Speech in Spiritualism**

Bakhtin observed that language is inherently dialogic as speakers respond to past utterances and anticipate future ones. Yet Bakhtin also noted that speakers can engage in monologic projects in attempts to unify voices and accents in the service of a single “carrier,” such as God or nation. I argue that monologism and dialogism are copresent tendencies in speech and that they can be analyzed productively in relation to a third term, “silence,” which can be dialogic as well as monologic. To attend to silence, it becomes necessary to examine monologically and dialogically oriented participant structures, pulling language ideologies and practices into the same analytical frame. I analyze the relationships between monologism and monologue,

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dialogism and dialogue, and silence in ritual speech at Spiritualist services. At these events, audience members silently generate healing energy, and mediums construct what I call “hinged dialogues” in which they have largely silent conversations with spirit figures and connect these conversations with living audience members who are compelled to respond in constrained but dialogically productive ways.

<https://www.journals.uchicago.edu/doi/abs/10.1086/728722>

### **KIM STERELNY & PETER HISCOCK – Cumulative Culture, Archaeology, and the Zone of Latent Solutions**

This paper begins with an analysis of Tennie’s account of hominin culture: the claims that cumulative culture depends on a distinctive form of social learning; that that form of social learning is absent in the great apes; that its archaeological signature in the hominin lineage is late; and, finally, that the forms of social learning available to apes and probably earlier hominins only accelerated their pathways to skills they could acquire for themselves. This synthesis is bold, and influential, and hence an appropriate target of critical reflection. But the further aim of the paper is to develop an alternative view of cumulative culture and its relation to our lineage. It accepts the view that copying is one aspect of cumulative culture. But the paper argues that cumulative culture depends as well on integrating information from a variety of social and nonsocial sources and through an array of sensory modalities. It is not mostly a matter of copying from models but is socially guided re-creation of the model’s skill. On this alternative view of cumulative culture, first, copying plays a less central role, and, second, cultures become cumulative not just through the incremental improvement of existing capacities.

<https://www.journals.uchicago.edu/doi/abs/10.1086/728723>

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## Evolutionary Anthropology

### PAPERS

#### **YAOWALAK CHAIMANEE et al – Early anthropoid primates: New data and new questions**

Although the evolutionary history of anthropoid primates (monkeys, apes, and humans) appears relatively well-documented, there is limited data available regarding their origins and early evolution. We review and discuss here the earliest records of anthropoid primates from Asia, Africa, and South America. New fossils provide strong support for the Asian origin of anthropoid primates. However, the earliest recorded anthropoids from Africa and South America are still subject to debate, and the early evolution and dispersal of platyrrhines to South America remain unclear. Because of the rarity and incomplete nature of many stem anthropoid taxa, establishing the phylogenetic relationships among the earliest anthropoids remains challenging. Nonetheless, by examining evidence from anthropoids and other mammalian groups, we demonstrate that several dispersal events occurred between South Asia and Afro-Arabia during the middle Eocene to the early Oligocene. It is possible that a microplate situated in the middle of the Neotethys Ocean significantly reduced the distance of overseas dispersal.

<https://onlinelibrary.wiley.com/doi/abs/10.1002/evan.22022>

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## Frontiers in Education

### PAPERS

#### **STEPH AINSWORTH & HUW BELL – Towards an Aesthetics of Grammar Learning: Lifting the Veil on Language**

School of Education, Faculty of Health and Education, Manchester Metropolitan University, Manchester, United Kingdom  
The last few decades have seen growing interest in the field of disciplinary aesthetics. While the physical sciences and mathematics have attracted significant interest in this area, relatively little attention has been given to the aesthetic potential of learning about the structure of one’s own native language. Within this paper, we bring together ideas from evolutionary aesthetics, philosophy, psychology and neuroscience to explore the question of what might characterize an aesthetics of grammar learning. The paper connects our previous empirical findings with theoretical developments across these disciplines. We argue that explicit grammar learning has a particular potential to evoke aesthetic experience due to its role as a mediator between procedural and declarative knowledge. We suggest that by facilitating the transformation from knowhow to knowledge, grammar learning has the potential to generate cognitive consonance, experienced as an aesthetic-epistemic feeling of fittingness. The discussion draws parallels between the characteristics of grammar and the properties of entities more traditionally conceived to be aesthetic (such as art works and performances). In particular, we note that meta-linguistic labels (grammar terms) provide concrete tokens which facilitate virtual models, supporting the transition from ‘automatism’ to ‘conscious reflection’. The paper concludes by exploring the implications for the field of disciplinary aesthetics and for developing pedagogies which maximize the aesthetic potential of grammar.

<https://www.frontiersin.org/articles/10.3389/feduc.2023.1305532/full>

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## Frontiers in Psychology

### PAPERS

#### **NABIL SALEH SUFYAN et al – Artificial intelligence and social intelligence: preliminary comparison study between AI models and psychologists**

Social intelligence (SI) is of great importance in the success of the counseling and psychotherapy, whether for the psychologist or for the artificial intelligence systems that help the psychologist, as it is the ability to understand the feelings,

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emotions, and needs of people during the counseling process. Therefore, this study aims to identify the Social Intelligence (SI) of artificial intelligence represented by its large linguistic models, “ChatGPT; Google Bard; and Bing” compared to psychologists.

A stratified random manner sample of 180 students of counseling psychology from the bachelor’s and doctoral stages at King Khalid University was selected, while the large linguistic models included ChatGPT-4, Google Bard, and Bing. They (the psychologists and the AI models) responded to the social intelligence scale.

There were significant differences in SI between psychologists and AI’s ChatGPT-4 and Bing. ChatGPT-4 exceeded 100% of all the psychologists, and Bing outperformed 50% of PhD holders and 90% of bachelor’s holders. The differences in SI between Google Bard and bachelor students were not significant, whereas the differences with PhDs were significant; Where 90% of PhD holders excel on Google Bird.

We explored the possibility of using human measures on AI entities, especially language models, and the results indicate that the development of AI in understanding emotions and social behavior related to social intelligence is very rapid. AI will help the psychotherapist a great deal in new ways. The psychotherapist needs to be aware of possible areas of further development of AI given their benefits in counseling and psychotherapy. Studies using humanistic and non-humanistic criteria with large linguistic models are needed.

<https://www.frontiersin.org/articles/10.3389/fpsyg.2024.1353022/full>

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## Mind & Language

### COMMENTARIES

#### **E.J. GREEN – Hill on perceptual relativity and perceptual error**

Christopher Hill's Perceptual experience is a must-read for philosophers of mind and cognitive science. Here I consider Hill's representationalist account of spatial perception. I distinguish two theses defended in the book. The first is that perceptual experience does not represent the enduring, intrinsic properties of objects, such as intrinsic shape or size. The second is that perceptual experience does represent certain viewpoint-dependent properties of objects—namely, Thouless properties. I argue that Hill's arguments do not establish the first thesis, and then I raise questions about the Thouless-property view and its role in Hill's defense of representationalism.

<https://onlinelibrary.wiley.com/doi/abs/10.1111/mila.12493?campaign=wolearlyview>

#### **ZOE JENKIN – Perception's objects, border, and epistemic role: Comments on Christopher Hill's Perceptual experience**

Christopher Hill's book Perceptual experience argues for a representational theory of mind that is grounded in empirical psychology. I focus here on three aspects of Hill's picture: The objects of visual awareness, the perception/cognition border, and the epistemic role of perceptual experience. I introduce challenges to Hill's account and consider ways these challenges may be overcome.

<https://onlinelibrary.wiley.com/doi/full/10.1111/mila.12478>

#### **JACK C. LYONS – Hill on perceptual contents, Thouless properties, and representational pluralism**

Part of a symposium on Christopher Hill's book, Perceptual experience. Hill argues that perceptual experiences typically represent objects as having exotic properties that he calls Thouless properties. This and his representational pluralism allow him to attribute less perceptual error than the view that experiences represent simple relational properties (only). However, I think it is plausible that perceptual systems do make these sorts of errors, which although pervasive and systematic, are relatively subtle and perfectly explicable. I also express some concerns about representational pluralism, especially in the context of a representationalist view of the phenomenal character of experience.

<https://onlinelibrary.wiley.com/doi/abs/10.1111/mila.12495>

#### **CHRISTOPHER S. HILL – Replies to E. J. Green, Zoe Jenkin, and Jack Lyons**

I argue for three claims. (1) The phenomenology of visual experience is exhausted by awareness of appearance properties (i.e., certain constantly changing characteristics of external objects that are relational and viewpoint-dependent). (2) Cognition differs from perception in that it has a purely discursive or linguistic dimension, whereas perception is pervasively analog and iconic; but this does not determine a border between the two domains, for cognition also has a massive iconic dimension. And (3) certain raging debates in teleosemantics can be resolved by acknowledging that perceptual representations in more primitive organisms tend to have dual contents (e.g., both small, moving black object, and food).

**[See OTHER PUBLICATIONS above.]**

<https://onlinelibrary.wiley.com/doi/abs/10.1111/mila.12488>

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## Nature

### NEWS

#### **This AI learnt language by seeing the world through a baby's eyes**

A neural network that taught itself to recognize objects using the filmed experiences of a single infant could offer new insights into how humans learn.



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<https://www.nature.com/articles/d41586-024-00288-1>

## ARTICLES

### **YVES BOUBENEC – How speech is produced and perceived in the human cortex**

A neural probe has been used to capture the activity of large populations of single neurons as people are speaking or listening, providing detailed insights into how the brain encodes specific features of speech.

<https://www.nature.com/articles/d41586-024-00078-9>

### **WILLIAM E. BANKS – Stone tools in northern Europe made by Homo sapiens 45,000 years ago**

DNA analyses of skeletal fragments from a site in Germany provide evidence that humans, rather than Neanderthals, were responsible for a particular stone-tool industry called the Lincombian–Ranisian–Jerzmanowician.

<https://www.nature.com/articles/d41586-024-00072-1>

## PAPERS

### **ARJUN R. KHANNA et al – Single-neuronal elements of speech production in humans**

Humans are capable of generating extraordinarily diverse articulatory movement combinations to produce meaningful speech. This ability to orchestrate specific phonetic sequences, and their syllabification and inflection over subsecond timescales allows us to produce thousands of word sounds and is a core component of language. The fundamental cellular units and constructs by which we plan and produce words during speech, however, remain largely unknown. Here, using acute ultrahigh-density Neuropixels recordings capable of sampling across the cortical column in humans, we discover neurons in the language-dominant prefrontal cortex that encoded detailed information about the phonetic arrangement and composition of planned words during the production of natural speech. These neurons represented the specific order and structure of articulatory events before utterance and reflected the segmentation of phonetic sequences into distinct syllables. They also accurately predicted the phonetic, syllabic and morphological components of upcoming words and showed a temporally ordered dynamic. Collectively, we show how these mixtures of cells are broadly organized along the cortical column and how their activity patterns transition from articulation planning to production. We also demonstrate how these cells reliably track the detailed composition of consonant and vowel sounds during perception and how they distinguish processes specifically related to speaking from those related to listening. Together, these findings reveal a remarkably structured organization and encoding cascade of phonetic representations by prefrontal neurons in humans and demonstrate a cellular process that can support the production of speech.

<https://www.nature.com/articles/s41586-023-06982-w>

### **DOROTHEA MYLOPOTAMITAKI et al with KAY PRÜFER, JOHANNES KRAUSE & JEAN-JACQUES HUBLIN – Homo sapiens reached the higher latitudes of Europe by 45,000 years ago**

The Middle to Upper Palaeolithic transition in Europe is associated with the regional disappearance of Neanderthals and the spread of Homo sapiens. Late Neanderthals persisted in western Europe several millennia after the occurrence of H. sapiens in eastern Europe. Local hybridization between the two groups occurred, but not on all occasions. Archaeological evidence also indicates the presence of several technocomplexes during this transition, complicating our understanding and the association of behavioural adaptations with specific hominin groups. One such technocomplex for which the makers are unknown is the Lincombian–Ranisian–Jerzmanowician (LRJ), which has been described in northwestern and central Europe. Here we present the morphological and proteomic taxonomic identification, mitochondrial DNA analysis and direct radiocarbon dating of human remains directly associated with an LRJ assemblage at the site Ilsenhöhle in Ranis (Germany). These human remains are among the earliest directly dated Upper Palaeolithic H. sapiens remains in Eurasia. We show that early H. sapiens associated with the LRJ were present in central and northwestern Europe long before the extinction of late Neanderthals in southwestern Europe. Our results strengthen the notion of a patchwork of distinct human populations and technocomplexes present in Europe during this transitional period.

<https://www.nature.com/articles/s41586-023-06923-7>

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## Nature Communications

### PAPERS

### **KEIKO OHMAE & SHOGO OHMAE – Emergence of syntax and word prediction in an artificial neural circuit of the cerebellum**

The cerebellum, interconnected with the cerebral neocortex, plays a vital role in human-characteristic cognition such as language processing, however, knowledge about the underlying circuit computation of the cerebellum remains very limited. To gain a better understanding of the computation underlying cerebellar language processing, we developed a biologically constrained cerebellar artificial neural network (cANN) model, which implements the recently identified cerebello-cerebellar recurrent pathway. We found that while cANN acquires prediction of future words, another function of syntactic recognition emerges in the middle layer of the prediction circuit. The recurrent pathway of the cANN was essential for the two language functions, whereas cANN variants with further biological constraints preserved these functions. Considering the uniform

structure of cerebellar circuitry across all functional domains, the single-circuit computation, which is the common basis of the two language functions, can be generalized to fundamental cerebellar functions of prediction and grammar-like rule extraction from sequences, that underpin a wide range of cerebellar motor and cognitive functions. This is a pioneering study to understand the circuit computation of human-characteristic cognition using biologically-constrained ANNs.

<https://www.nature.com/articles/s41467-024-44801-6>

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## Nature Ecology & Evolution

### PAPERS

#### **GEOFF M. SMITH et al with JOHANNES KRAUSE & JEAN-JACQUES HUBLIN – The ecology, subsistence and diet of ~45,000-year-old *Homo sapiens* at Ilsenhöhle in Ranis, Germany**

Recent excavations at Ranis (Germany) identified an early dispersal of *Homo sapiens* into the higher latitudes of Europe by 45,000 years ago. Here we integrate results from zooarchaeology, palaeoproteomics, sediment DNA and stable isotopes to characterize the ecology, subsistence and diet of these early *H. sapiens*. We assessed all bone remains ( $n = 1,754$ ) from the 2016–2022 excavations through morphology ( $n = 1,218$ ) or palaeoproteomics (zooarchaeology by mass spectrometry ( $n = 536$ ) and species by proteome investigation ( $n = 212$ )). Dominant taxa include reindeer, cave bear, woolly rhinoceros and horse, indicating cold climatic conditions. Numerous carnivore modifications, alongside sparse cut-marked and burnt bones, illustrate a predominant use of the site by hibernating cave bears and denning hyaenas, coupled with a fluctuating human presence. Faunal diversity and high carnivore input were further supported by ancient mammalian DNA recovered from 26 sediment samples. Bulk collagen carbon and nitrogen stable isotope data from 52 animal and 10 human remains confirm a cold steppe/tundra setting and indicate a homogenous human diet based on large terrestrial mammals. This lower-density archaeological signature matches other Lincombian–Ranisian–Jerzmanowician sites and is best explained by expedient visits of short duration by small, mobile groups of pioneer *H. sapiens*.

<https://www.nature.com/articles/s41559-023-02303-6>

#### **SARAH PEDERZANI et al with JEAN-JACQUES HUBLIN – Stable isotopes show *Homo sapiens* dispersed into cold steppes ~45,000 years ago at Ilsenhöhle in Ranis, Germany**

The spread of *Homo sapiens* into new habitats across Eurasia ~45,000 years ago and the concurrent disappearance of Neanderthals represents a critical evolutionary turnover in our species' history. 'Transitional' technocomplexes, such as the Lincombian–Ranisian–Jerzmanowician (LRJ), characterize the European record during this period but their makers and evolutionary significance have long remained unclear. New evidence from Ilsenhöhle in Ranis, Germany, now provides a secure connection of the LRJ to *H. sapiens* remains dated to ~45,000 years ago, making it one of the earliest forays of our species to central Europe. Using many stable isotope records of climate produced from 16 serially sampled equid teeth spanning ~12,500 years of LRJ and Upper Palaeolithic human occupation at Ranis, we review the ability of early humans to adapt to different climate and habitat conditions. Results show that cold climates prevailed across LRJ occupations, with a temperature decrease culminating in a pronounced cold excursion at ~45,000–43,000 cal BP. Directly dated *H. sapiens* remains confirm that humans used the site even during this very cold phase. Together with recent evidence from the Initial Upper Palaeolithic, this demonstrates that humans operated in severe cold conditions during many distinct early dispersals into Europe and suggests pronounced adaptability.

<https://www.nature.com/articles/s41559-023-02318-z>

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## Nature European Journal of Human Genetics

### PAPERS

#### **YAN MENG et al – The value of genomic testing in severe childhood speech disorders**

With increasing gene discoveries for severe speech disorders, genomic testing can alter the diagnostic and clinical paradigms, enabling better life outcomes for children and their families. However, evidence on the value of the outcomes generated is lacking, impeding optimal translation into health care. This study aims to estimate the value and uptake of genomic testing for severe childhood speech disorders. A discrete choice experiment was undertaken to elicit preferences for genomic testing from the perspective of the Australian public ( $n = 951$ ) and parents of children experiencing severe speech disorder ( $n = 56$ ). Choice attributes associated with genomic testing were identified through focus groups. A Bayesian D-efficient design was used to develop choice scenarios and choice data were analyzed using a panel error component mixed logit model and a latent class model. Statistically significant preferences were identified across all seven attributes. The mean monetary value of the benefits of genomic testing relative to standard diagnostic care in Australia was estimated at AU\$7489 (US\$5021) and AU\$4452 (US\$2985) from the perspectives of the Australian public and families with lived experience of severe speech disorders, with a corresponding test uptake of 94.2% and 99.6%. To ensure fair prioritization of genomics, decision-makers need to consider the wide range of risks and benefits associated with genomic information.

<https://www.nature.com/articles/s41431-024-01534-w>

## Nature Human Behaviour

### ARTICLES

#### **REUVEN YESHURUN – Signalling Palaeolithic Identity**

The sense of belonging to a larger group is a central feature of humanity but its identification in Palaeolithic societies is challenging. Baker et al. use a pan-European dataset of personal ornaments to show that these markers of group identity form distinct clusters that cannot be explained simply by geographical proximity or shared biological descent.

<https://www.nature.com/articles/s41562-023-01805-4>

### PAPERS

#### **JACK BAKER et al with FRANCESCO D'ERRICO – Evidence from personal ornaments suggest nine distinct cultural groups between 34,000 and 24,000 years ago in Europe**

Mechanisms governing the relationship between genetic and cultural evolution are the subject of debate, data analysis and modelling efforts. Here we present a new georeferenced dataset of personal ornaments worn by European hunter-gatherers during the so-called Gravettian technocomplex (34,000–24,000 years ago), analyse it with multivariate and geospatial statistics, model the impact of distance on cultural diversity and contrast the outcome of our analyses with up-to-date palaeogenetic data. We demonstrate that Gravettian ornament variability cannot be explained solely by isolation-by-distance. Analysis of Gravettian ornaments identified nine geographically discrete cultural entities across Europe. While broadly in agreement with palaeogenetic data, our results highlight a more complex pattern, with cultural entities located in areas not yet sampled by palaeogenetics and distinctive entities in regions inhabited by populations of similar genetic ancestry. Integrating personal ornament and biological data from other Palaeolithic cultures will elucidate the complex narrative of population dynamics of Upper Palaeolithic Europe.

<https://www.nature.com/articles/s41562-023-01803-6>

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## Nature Mental Health

### PAPERS

#### **SASKIA ZIMMERMANN et mul – Asymmetry, cytoarchitectonic morphology and genetics associated with Broca's area in schizophrenia**

A common hypothesis on the etiopathology of schizophrenia is that the failure of segregation of right from left hemisphere functions is a core deficit in psychosis. It has even been proposed that schizophrenia symptoms in general may reflect a hemispheric 'dominance failure' for language and that the corresponding predisposition is genetic. Here, we show that reduced asymmetries of cytoarchitectonic Broca's subareas link to the degree of specific psychopathology and that specific gray matter reductions of subareas are related to a cognitive and a negative subtype of schizophrenia. Gene expression analyses indicate an upregulation of the MET gene in these particular areas, which has been implicated in neurodevelopment as well as neurocognition and influences the risk for schizophrenia. Our integrative findings suggest that variations of MET are associated with distinct structural alterations at the subregional level in key language regions, which may contribute to development of specific psychopathology in schizophrenia.

<https://www.nature.com/articles/s44220-023-00200-2>

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## Nature Scientific Reports

### PAPERS

#### **BAOJUN LAI et al – Atypical brain lateralization for speech processing at the sublexical level in autistic children revealed by fNIRS**

Autistic children often exhibit atypical brain lateralization of language processing, but it is unclear what aspects of language contribute to this phenomenon. This study employed functional near-infrared spectroscopy to measure hemispheric lateralization by estimating hemodynamic responses associated with processing linguistic and non-linguistic auditory stimuli. The study involved a group of autistic children (N = 20, mean age = 5.8 years) and a comparison group of nonautistic peers (N = 20, mean age = 6.5 years). The children were presented with stimuli with systematically decreasing linguistic relevance: naturalistic native speech, meaningless native speech with scrambled word order, nonnative speech, and music. The results revealed that both groups showed left lateralization in the temporal lobe when listening to naturalistic native speech. However, the distinction emerged between autism and nonautistic in terms of processing the linguistic hierarchy. Specifically, the nonautistic comparison group demonstrated a systematic reduction in left lateralization as linguistic relevance decreased. In contrast, the autism group displayed no such pattern and showed no lateralization when listening to scrambled native speech accompanied by enhanced response in the right hemisphere. These results provide evidence of atypical neural specialization for spoken language in preschool- and school-age autistic children and shed new light on the underlying linguistic correlates contributing to such atypicality at the sublexical level.

<https://www.nature.com/articles/s41598-024-53128-7>

**FABIAN BAUMANN, AGNIESZKA CZAPLICKA & IYAD RAHWAN – Network structure shapes the impact of diversity in collective learning**

It is widely believed that diversity arising from different skills enhances the performance of teams, and in particular, their ability to learn and innovate. However, diversity has also been associated with negative effects on the communication and coordination within collectives. Yet, despite the importance of diversity as a concept, we still lack a mechanistic understanding of how its impact is shaped by the underlying social network. To fill this gap, we model skill diversity within a simple model of collective learning and show that its effect on collective performance differs depending on the complexity of the task and the network density. In particular, we find that diversity consistently impairs performance in simple tasks. In contrast, in complex tasks, link density modifies the effect of diversity: while homogeneous populations outperform diverse ones in sparse networks, the opposite is true in dense networks, where diversity boosts collective performance. Our findings also provide insight on how to forge teams in an increasingly interconnected world: the more we are connected, the more we can benefit from diversity to solve complex problems.

<https://www.nature.com/articles/s41598-024-52837-3>

**JAMES P. TRUJILLO & JUDITH HOLLER – Conversational facial signals combine into compositional meanings that change the interpretation of speaker intentions**

Human language is extremely versatile, combining a limited set of signals in an unlimited number of ways. However, it is unknown whether conversational visual signals feed into the composite utterances with which speakers communicate their intentions. We assessed whether different combinations of visual signals lead to different intent interpretations of the same spoken utterance. Participants viewed a virtual avatar uttering spoken questions while producing single visual signals (i.e., head turn, head tilt, eyebrow raise) or combinations of these signals. After each video, participants classified the communicative intention behind the question. We found that composite utterances combining several visual signals conveyed different meaning compared to utterances accompanied by the single visual signals. However, responses to combinations of signals were more similar to the responses to related, rather than unrelated, individual signals, indicating a consistent influence of the individual visual signals on the whole. This study therefore provides first evidence for compositional, non-additive (i.e., Gestalt-like) perception of multimodal language.

<https://www.nature.com/articles/s41598-024-52589-0>

**LINOY SCHWARTZ et al – Generation WhatsApp: inter-brain synchrony during face-to-face and texting communication**

Texting has become one of the most prevalent ways to interact socially, particularly among youth; however, the effects of text messaging on social brain functioning are unknown. Guided by the biobehavioral synchrony frame, this pre-registered study utilized hyperscanning EEG to evaluate interbrain synchrony during face-to-face versus texting interactions. Participants included 65 mother-adolescent dyads observed during face-to-face conversation compared to texting from different rooms. Results indicate that both face-to-face and texting communication elicit significant neural synchrony compared to surrogate data, demonstrating for the first time brain-to-brain synchrony during texting. Direct comparison between the two interactions highlighted 8 fronto-temporal interbrain links that were significantly stronger in the face-to-face interaction compared to texting. Our findings suggest that partners co-create a fronto-temporal network of inter-brain connections during live social exchanges. The degree of improvement in the partners' right-frontal-right-frontal connectivity from texting to the live social interaction correlated with greater behavioral synchrony, suggesting that this well-researched neural connection may be specific to face-to-face communication. Our findings suggest that while technology-based communication allows humans to synchronize from afar, face-to-face interactions remain the superior mode of communication for interpersonal connection. We conclude by discussing the potential benefits and drawbacks of the pervasive use of texting, particularly among youth.

<https://www.nature.com/articles/s41598-024-52587-2>

**GISELA SOBRAL et al – Facial and genital color ornamentation, testosterone, and reproductive output in high-ranking male rhesus macaques**

Males in many vertebrate species have colorful ornaments that evolved by sexual selection. The role of androgens in the genesis and maintenance of these signals is unclear. We studied 21 adult high-ranking male rhesus macaques from nine social groups in the free-ranging population on Cayo Santiago, Puerto Rico, and analyzed facial and genital skin luminance and redness, fecal androgens, rates of mating behaviors, and offspring sired. Facial and genital coloration varied in relation to age, mating behavior, reproductive success, and testosterone concentration. Our results indicate that skin coloration in high-ranking male rhesus macaques is a sexually-selected trait mediated by androgens. These results add to the growing literature on the proximate and ultimate causes of male sexual signals and highlight the need to examine how these characteristics change with age in other species.

<https://www.nature.com/articles/s41598-024-52400-0>

## New Scientist

### NEWS

#### **Modern humans were already in northern Europe 45,000 years ago**

DNA from bones found in a cave in Germany has been identified as from *Homo sapiens*, showing that our species endured frigid conditions there as they expanded across the continent.

<https://www.newscientist.com/article/2415037-modern-humans-were-already-in-northern-europe-45000-years-ago/>

#### **Orangutan calls have an intricate structure resembling human language**

Calls made by male orangutans to attract females have short sequences nested inside longer sequences – a feature called recursion that was thought to be unique to human language.

<https://www.newscientist.com/article/2414437-orangutan-calls-have-an-intricate-structure-resembling-human-language/>

### ARTICLES

#### **TOM RIVLIN – A bold new take on quantum theory could reveal how reality emerges**

At the smallest scales, everything is made out of a cloud of quantum possibilities. A new idea attempts to explain how our everyday world comes from this, using the laws of thermodynamics.

<https://www.newscientist.com/article/mg26134762-400-a-bold-new-take-on-quantum-theory-could-reveal-how-reality-emerges/>

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## PeerJ

### PAPERS

#### **ASHLEIGH L.A. WISEMAN, JAMES P. CHARLES & JOHN R. HUTCHINSON – Static versus dynamic muscle modelling in extinct species: a biomechanical case study of the *Australopithecus afarensis* pelvis and lower extremity**

The force a muscle generates is dependent on muscle structure, in which fibre length, pennation angle and tendon slack length all influence force production. Muscles are not preserved in the fossil record and these parameters must be estimated when constructing a musculoskeletal model. Here, we test the capability of digitally reconstructed muscles of the *Australopithecus afarensis* model (specimen AL 288-1) to maintain an upright, single-support limb posture. Our aim was to ascertain the influence that different architectural estimation methods have on muscle specialisation and on the subsequent inferences that can be extrapolated about limb function. Parameters were estimated for 36 muscles in the pelvis and lower limb and seven different musculoskeletal models of AL 288-1 were produced. These parameters represented either a 'static' Hill-type muscle model ( $n = 4$  variants) which only incorporated force, or instead a 'dynamic' Hill-type muscle model with an elastic tendon and fibres that could vary force-length-velocity properties ( $n = 3$  variants). Each muscle's fibre length, pennation angle, tendon slack length and maximal isometric force were calculated based upon different input variables. Static (inverse) simulations were computed in which the vertical and mediolateral ground reaction forces (GRF) were incrementally increased until limb collapse (simulation failure). All AL 288-1 variants produced somewhat similar simulated muscle activation patterns, but the maximum vertical GRF that could be exerted on a single limb was not consistent between models. Three of the four static-muscle models were unable to support  $>1.8$  times body weight and produced models that under-performed. The dynamic-muscle models were stronger. Comparative results with a human model imply that similar muscle group activations between species are needed to sustain single-limb support at maximally applied GRFs in terms of the simplified static simulations (e.g., same walking pose) used here. This approach demonstrated the range of outputs that can be generated for a model of an extinct individual. Despite mostly comparable outputs, the models diverged mostly in terms of strength.

<https://peerj.com/articles/16821/>

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## Philosophical Transactions of the Royal Society A

### PAPERS

#### **DAPHNE WANG & MEHRNOOSH SADRZADEH – Causality and signalling of garden-path sentences**

Sheaves are mathematical objects that describe the globally compatible data associated with open sets of a topological space. Original examples of sheaves were continuous functions; later they also became powerful tools in algebraic geometry, as well as logic and set theory. More recently, sheaves have been applied to the theory of contextuality in quantum mechanics. Whenever the local data are not necessarily compatible, sheaves are replaced by the simpler setting of presheaves. In previous work, we used presheaves to model lexically ambiguous phrases in natural language and identified the order of their disambiguation. In the work presented here, we model syntactic ambiguities and study a phenomenon in human parsing called garden-pathing. It has been shown that the information-theoretic quantity known as 'surprisal' correlates with human reading times in natural language but fails to do so in garden-path sentences. We compute the degree of signalling in our presheaves using probabilities from the large language model BERT and evaluate predictions on two psycholinguistic datasets. Our degree of signalling outperforms surprisal in two ways: (i) it distinguishes between hard and easy garden-path sentences (with a  $p$ -value  $< 10^{-5}$ ), whereas existing work could not, (ii) its garden-path effect is larger in one of the datasets (32 ms versus 8.75 ms per word), leading to better prediction accuracies.

## PLoS Biology

### PAPERS

#### **ZIYUE GAO – Unveiling recent and ongoing adaptive selection in human populations**

Genome-wide scans for signals of selection have become a routine part of the analysis of population genomic variation datasets and have resulted in compelling evidence of selection during recent human evolution. This Essay spotlights methodological innovations that have enabled the detection of selection over very recent timescales, even in contemporary human populations. By harnessing large-scale genomic and phenotypic datasets, these new methods use different strategies to uncover connections between genotype, phenotype, and fitness. This Essay outlines the rationale and key findings of each strategy, discusses challenges in interpretation, and describes opportunities to improve detection and understanding of ongoing selection in human populations.

<https://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.3002469>

#### **FANHUA GUO et al – Human subcortical pathways automatically detect collision trajectory without attention and awareness**

Detecting imminent collisions is essential for survival. Here, we used high-resolution fMRI at 7 Tesla to investigate the role of attention and consciousness for detecting collision trajectory in human subcortical pathways. Healthy participants can precisely discriminate collision from near-miss trajectory of an approaching object, with pupil size change reflecting collision sensitivity. Subcortical pathways from the superior colliculus (SC) to the ventromedial pulvinar (vmPul) and ventral tegmental area (VTA) exhibited collision-sensitive responses even when participants were not paying attention to the looming stimuli. For hemianopic patients with unilateral lesions of the geniculostriate pathway, the ipsilesional SC and VTA showed significant activation to collision stimuli in their scotoma. Furthermore, stronger SC responses predicted better behavioral performance in collision detection even in the absence of awareness. Therefore, human tectofugal pathways could automatically detect collision trajectories without the observers' attention to and awareness of looming stimuli, supporting "blindsight" detection of impending visual threats.

<https://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.3002375>

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## PLoS One

### PAPERS

#### **JOHANNE SMITH-NIELSEN et al – The significance of parental mentalizing for four-year-old children's solitary pretend play**

Pretend play is a signature behavior of early childhood and is considered to reflect the child's emerging symbolic function, enabling the interpretation of social signals, language development, and emotion understanding. While theory links parental mentalizing with children's pretend play, only a few studies have investigated this association. These studies are limited to infancy and early toddlerhood, and child pretend play is assessed during play with an adult (social play). Based on the assumption that child solitary pretend play reflects the child's 'baseline' pretend play ability, in this study, we investigated children's pretend play at its peak, i.e., during the preschool age, without the facilitation of another player. The overall objective was to investigate if parental mentalizing increases pretend play complexity in children.

The sample consisted 99 Danish mothers and their 4-year-old children. Employing a cross-sectional design, we hypothesized that parental mental state language, as an indicator of 'online' mentalizing during interaction with the child, is a mechanism through which 'offline' mentalizing, measured as parental reflective functioning, is associated with child solitary pretend play. Child pretend play complexity was observed and coded with an adapted version of the 12-Step Play Scale. Maternal offline mentalizing was assessed with the Parental Reflective Functioning Questionnaire, and maternal online mentalizing was assessed by coding the mothers' mental state language during interaction with the child using a modified version of the mind-mindedness coding scheme.

While there was no direct effect of maternal offline reflective functioning on child pretend play, online mental state language mediated the link between offline maternal reflective functioning and child pretend play.

These results provide support for the theoretically assumed link between parental mentalizing and children's capacity for pretend play. Furthermore, our study contributes to the literature on parental mentalization, suggesting that parental mentalizing facilitates child development only if the parent can translate this ability into 'mentalizing in action'.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0297671>

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## Royal Society Open Science

### PAPERS

#### **EDWIN DICKINSON, MELODY W. YOUNG & MICHAEL C. GRANATOSKY – Beakiation: how a novel parrot gait expands the locomotor repertoire of living birds**

Occupation of arboreal habitats poses myriad locomotor challenges, driving both anatomical and behavioural innovations across various tetrapod lineages. Here, we report and biomechanically assess a novel, beak-driven locomotor mode—

'beakiation'—by which parrots advance along the underside of narrow arboreal substrates. Using high-speed videography and kinetic analyses, we describe the limb loading patterns and pendular mechanics of beakiation, and compare the biomechanical characteristics of this gait with other suspensory behaviours (namely, forelimb-driven brachiation and inverted quadrupedal walking). We report that the parrot beak experiences comparable force magnitudes (approx. 150% body weight in the normal plane; approx. 50% body weight in the fore–aft plane) to the forelimbs of brachiating primates. Parrot beakiation is also characterized by longer-than-expected pendular periods, similar to observations of gibbon brachiation. However, in terms of mechanical energy recovery, beakiation is typified by lower levels of energetic recovery than brachiating specialists: a product of its slower, more careful nature. The observation of this novel behaviour—which adds to a growing base of literature regarding beak-assisted locomotor strategies in birds—highlights the extraordinary behavioural plasticity of birds, the functional versatility of the avian beak, and the difficulties in reconstructing an animal's locomotor repertoire from morphological characteristics alone.

<https://royalsocietypublishing.org/doi/10.1098/rsos.231397>

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## Science

### NEWS

#### **Mysterious artifacts suggest modern humans and Neanderthals lived side by side for millennia**

Hunters of our species braved cold, harsh conditions as they pushed into ice age Europe.

<https://www.science.org/content/article/mysterious-ice-age-artifacts-suggest-modern-humans-and-neanderthals-overlapped-europe>

### PAPERS

#### **WAI KEEN VONG et al – Grounded language acquisition through the eyes and ears of a single child**

Starting around 6 to 9 months of age, children begin acquiring their first words, linking spoken words to their visual counterparts. How much of this knowledge is learnable from sensory input with relatively generic learning mechanisms, and how much requires stronger inductive biases? Using longitudinal head-mounted camera recordings from one child aged 6 to 25 months, we trained a relatively generic neural network on 61 hours of correlated visual-linguistic data streams, learning feature-based representations and cross-modal associations. Our model acquires many word-referent mappings present in the child's everyday experience, enables zero-shot generalization to new visual referents, and aligns its visual and linguistic conceptual systems. These results show how critical aspects of grounded word meaning are learnable through joint representation and associative learning from one child's input.

<https://www.science.org/doi/10.1126/science.adi1374>

#### **NATASHA ABNER et al – Computational phylogenetics reveal histories of sign languages**

Sign languages are naturally occurring languages. As such, their emergence and spread reflect the histories of their communities. However, limitations in historical recordkeeping and linguistic documentation have hindered the diachronic analysis of sign languages. In this work, we used computational phylogenetic methods to study family structure among 19 sign languages from deaf communities worldwide. We used phonologically coded lexical data from contemporary languages to infer relatedness and suggest that these methods can help study regular form changes in sign languages. The inferred trees are consistent in key respects with known historical information but challenge certain assumed groupings and surpass analyses made available by traditional methods. Moreover, the phylogenetic inferences are not reducible to geographic distribution but do affirm the importance of geopolitical forces in the histories of human languages.

<https://www.science.org/doi/10.1126/science.add7766>

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## Science Advances

### PAPERS

#### **NICHOLAS J. CONARD & VEERLE ROTS – Rope making in the Aurignacian of Central Europe more than 35,000 years ago**

Evidence for the manufacture and use of fiber technology such as rope and twine is rare in the Paleolithic, despite the widely held view that such artifacts were in regular use during the Pleistocene. On the basis of the discovery of a more than 35,000-year-old perforated baton made from mammoth ivory at Hohle Fels Cave in Ach Valley of southwestern Germany together with experimental studies, we are now able to demonstrate one way people of the early Upper Paleolithic manufactured rope. This work contributes to our understanding of the evolution of technology, cooperative work, and Paleolithic social organization.

<https://www.science.org/doi/10.1126/sciadv.adh5217>

## Trends in Cognitive Sciences

### COMMENTARIES

#### **TOBIAS GROSSMANN – Neurodevelopmental and evolutionary origins of processing social interactions**

In their recent article in TiCS, McMahon and Isik present evidence to argue that the core of third-party social interaction perception is visual in nature, selectively relying upon a specialized region in superior temporal sulcus (STS). This view is presented in contrast to the prevalent notion that third-party social interaction perception is part of higher level social cognitive processes, supporting the attribution and interpretation of mental states. While the behavioral, computational, and neural evidence put forward to support McMahon and Isik's claims is compelling and may well account for human adult brain function, critical research examining the neurodevelopmental and evolutionary origins of processing third-party social interactions has been overlooked and needs to be integrated to arrive at a more complete picture of how processing social interaction is achieved in the human brain.

[Original paper in EAORC Bulletin 1,060]

[https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613\(23\)00285-1](https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(23)00285-1)

#### **EMALIE MCMAHON & LEYLA ISIK – The neurodevelopmental origins of seeing social interactions**

In a recent letter, Grossmann argues that, in young children and non-human primates, third-party social interaction recognition is supported by top-down processing in the medial prefrontal cortex (mPFC). He suggests that top-down signals in the developing brain may be used to train neural systems in the superior temporal sulcus (STS), which, in adults, appears to process social interactions in a visual manner. The hypothesis that the visual computations supporting social interactions are trained using top-down signals from the mentalization network is interesting. However, activation of mPFC when viewing social interactions does not preclude visual processing. As we discuss in our original article, when seeing social interactions, viewers can make rich inferences about the goals and mental states of the interacting agents. Young children and non-human primates may spontaneously engage higher-level cognitive processes when viewing social interactions, but we argue these processes are separate from the recognition of the interaction itself. Later, we review evidence suggesting that social interactions are processed visually in both young children and non-human primates and that STS selectivity emerges early in life.

[https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613\(23\)00307-8](https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(23)00307-8)

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## Trends in Ecology and Evolution

### PAPERS

#### **ROBERT A. FOLEY & MARTA MIRAZÓN LAHR – Ghosts of extinct apes: genomic insights into African hominid evolution**

We are accustomed to regular announcements of new hominin fossils. There are now some 6000 hominin fossils, and up to 31 species. However, where are the announcements of African ape fossils? The answer is that there are almost none. Our knowledge of African ape evolution is based entirely on genomic analyses, which show that extant diversity is very young. This contrasts with the extensive and deep diversity of hominins known from fossils. Does this difference point to low and late diversification of ape lineages, or high rates of extinction? The comparative evolutionary dynamics of African hominids are central to interpreting living ape adaptations, as well as understanding the patterns of hominin evolution and the nature of the last common ancestor.

[https://www.cell.com/trends/ecology-evolution/fulltext/S0169-5347\(23\)00347-6](https://www.cell.com/trends/ecology-evolution/fulltext/S0169-5347(23)00347-6)

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